UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ONE CONGRESS STREET, SUITE 1100
BOSTON, MA 02114-2023

January 15, 2008

Steve Morrow
Olin Corporation
3855 North Ocoee Street
Suite 200
Cleveland, TN 37312

Subject: Review of DRAFT Focused Remedial Investigation Report
Olin Chemical Superfund Site, Wilmington, Massachusetts

Dear Mr. Morrow:

In accordance with Paragraph 40 of the Administrative Settlement Agreement and Order on Consent (AOC), Region I of the United States Environmental Protection Agency (EPA) has reviewed the above-referenced document prepared by MACTEC and dated October 2007.

Pursuant to Section 1.III.D of the Remedial Investigation/Feasibility Study Statement of Work (RI/FS SOW), EPA solicited comments from external state and local stakeholders and has consolidated written comments received within the context of this letter. Original comment letters are enclosed and should be also be reviewed in developing the pending RI/FS Work Plan.

Comment letters prepared by EPA's internal risk assessor, Rick Sugatt, and EPA's consultant, Nobis Engineering, are also enclosed and are not consolidated within this letter.

The Focused Remedial Investigation Report (FRI) is a compilation of existing data and was prepared under the terms of the AOC to provide a mechanism for EPA to review the quality and completeness of the existing data set, and related evaluations. The primary objective of the FRI is to identify data gaps to be addressed through field work to be proposed in the RI/FS Work Plan.

Given the size and complexity of the FRI, this letter constitutes preliminary broad-base comments only. Detailed review of the FRI is ongoing, and additional comments are anticipated. EPA does not anticipate that Olin will be required to revise the FRI, however a written response to comments and supplementation information is requested. Resolution of comments will be reflected in the development of the RI/FS Work Plan.

General Issues

1. Extensive figures are provided for each media and operable unit. However, groundwater figures do not contain plume contours for target compounds. Please provide contour maps for NDMA and other target contaminants in DAPL, the diffusion layer and the overlying shallow groundwater.

2. There is a general lack of referencing throughout the document. From the reference list provided in Section 8.0, it is impossible to verify which references support which statements. A general reference to the "Smith Report" appears throughout statements in this document. The Smith Report is also a large multi-volume document. Specific references would greatly facilitate review of the FRI.

3. A 10% detection rule appears to be broadly applied to all data sets, resulting in the dismissal of positive detections from further consideration. While it may be appropriate to dismiss some results as anomalous when large well defined data sets are present, it may not be appropriate to dismiss such results from smaller data sets.

4. A statement is made in Section 4.2.2.2.6 that, "Petroleum hydrocarbons are exempt from CERCLA." While there is petroleum exclusion under CERCLA, the exclusion is generally limited to pure petroleum and perhaps refinery additives. It does not apply to petroleum wastes.

Risk Assessment Issues

1. Have any samples of wetland plant species been analyzed to trace potential accumulation of contaminants in relevant areas?

2. Ambient Water Quality Criteria shall apply to all surface water bodies for the purposes of the OU1 and OU2 RI, and not just those where fish have been observed.

3. Given the differences in the MCP and NCP risk assessment process, the limited nature of the existing risk assessments, and per Section 7.0 of the RI/FS SOW, the RI/FS Work Plan should incorporate development of a comprehensive baseline human health and ecological risk assessments for each operable unit (as appropriate.)

Bedrock Issues

1. The FRI concludes that migration of DAPL or dissolved constituents into bedrock fractures is not occurring due to precipitation of As-Cr deposits. What evidence in bedrock corings indicate that the fractures were completely infilled with

precipitate and therefore reduced porosity and transmissivity to a point of almost negligible consequence?

2. A subset of boring and well construction logs were provided to EPA in response to comments on the Draft Interim Response Steps Work Plan for locations associated with Plant B and the slurry wall/cap area. Please provide all other available boring and well construction logs for the OU3 study area.

3. There is a significant amount of information provided regarding bedrock contours, but very little information regarding fracture lithology. Has borehole geophysics or fracture trace analysis been performed within the study area? If so, please supply or reference the results (specific references please).

Groundwater Issues

1. The FRI divides Operable Unit 3 into sub-units based on groundwater use classification ("Zone II" and "Area Outside Zone II."). Zone II being a current or potential drinking water source and the Area Outside Zone II not a current or potential drinking water source. The FRI then goes on to state that federal and Massachusetts MCLs (i.e., drinking water standards) are not relevant to the Area Outside Zone II. Although MCLs may not be "applicable" given the existing Zone II delineation, MCLs are likely to be considered "relevant and appropriate" based on groundwater flow patterns, and as identified in the preliminary ARARs tables in Appendix G. All groundwater should be considered as a potential potable source for purposes of the OU3 RI and related human health risk assessment. Final ARARs and clean-up targets will be made in the FS.

2. The FRI states that, "Within the boundaries of the Site, there are currently no community or private water supplies." There are private and commercial wells located within the study area (some are shown within the extent of impacted groundwater delineation on Figure 4.3-28), and therefore the Site boundaries. It appears that only wells which have been sampled are included in the FRI. A complete well survey should be provided for wells located within in the study area (i.e., within a reasonable distance from the known impacted groundwater delineation). EPA anticipates sampling of private wells through the OU3 RI, or as otherwise needed.

3. How will the precipitation of Chromium (III) above the DAPL pools effect the hydraulic conductivity of the overburden and groundwater flow in these areas and will this in turn effect diffusion of the DAPL constituents into the groundwater?

4. Is there any change in groundwater flow or additional mixing of groundwater caused by the absorption/diffusion/advection processes occurring just above the DAPL, which may increase the movement of contaminants from the DAPL into

the groundwater?

5. Is there any way to measure how rapid DAPL attenuation is occurring vs. DAPL diffusion into the groundwater?

6. What is the main reason for the rapid attenuation of contaminant concentrations vertically from the DAPL layer to the shallow groundwater? Is it simply a lack of mixing or lower permeability soils in these areas or both?

7. Please describe in more detail the "diffuse groundwater" described at the end of the first paragraph on page 4-64. Does it also have a unique specific gravity (similar to the DAPL)? What are the concentrations of contaminants? What are the migration patterns and fate and transport? Is there a correlation to density and contaminant concentration similar to identifying the DAPL pools?

8. On page 5-22, what are the margins of error in incorporating the trend analysis and the small amounts of data points? Did this have any effect the confidence of the conclusions?

Surface/Subsurface Soil

1. There are areas of OU1 that require further characterization. Generally, these areas include sub-slab soils under remaining foundations, and areas outside of former discharge and production locations. The "Historical Facilities Features" Figure 1.4-1 does not display subsurface features such as underground storage tanks, domestic and commercial leach pits and distribution boxes, and related piping. The text states that underground storage tanks were closed in place. More detail is needed with regard to tank locations, closure dates and methods, and any structural integrity testing.

2. The placement of deed restrictions or other institutional controls on a property do not waive requirements to evaluate impacted media. The FRI states that deed restrictions will prevent the removal of existing foundations, and therefore sub-slab soils do not need to be characterized. Sub-slab soils do still need to be characterized do determine potential risks or to assess if they constitute a source for groundwater contamination. If it is determined that such soils do constitute an actual or potential risk, then institutional controls could be one of several remedial options evaluated in the FS.

3. What soil contaminants, surface and subsurface, are located under the temporary cap within the slurry wall containment area?

Surface Water Issues

1. NDMA has been detected in the East and South Ditches, as well as in MMB and Sawmill Brook. The detections in the East and South Ditches were determined to not pose a risk based on focused human health and ecological risk assessments. The detections in MMB and Sawmill Brook were flagged by the validator and concluded to be false positives. Further field investigations are necessary to determine the full extent of NDMA.

2. A detailed figure for OU2 is necessary to more accurately display the area to the south of the confluence of the East and South Ditches. Detail should include the East Ditch, Landfill Brook, Halls Brook, New Boston Street Drainway and North Pond, and display previous and current conditions. The concerns here are that ammonia and NDMA are present at the confluence of the East and South Ditch. The contribution of ammonia from Landfill Brook appears to be less than from East Brook based on the one known data point, although the FRI calls this a substantial source. EPA understands that North Pond was hydraulically connected to the surface water drainage system prior to substantial fill being placed in that area, and as such, has reason to believe that the full extent of contamination for OU2 has not yet been characterized. In general, the interaction of groundwater to all surface water features in this portion of the study area requires further evaluation under OU2. The FRI states that aquatic life (i.e., fish) have not been observed in these features, but it is unclear if an actual aquatic-life survey has been performed.

Background Values

1. The application of background values will require further review. The background concentration for ammonia appears to be elevated, and the use of groundwater background values from the Industriplex Site may not be appropriate.

ARARs

1. The following should be added to an updated ARARs table in the RI/FS Work Plan:
   - Clean Water Act Ambient Water Quality Criteria (AWQC) for surface water and any analogous state standard.
   - ARARs for possible groundwater extraction and treatment such as NPDES and the analogous state standards.
   - Certain RCRA landfill closure regulations such as Subtitle C and D, and post-closure regulations such as 264 Subparts G and F.
   - Federal and state guidance and criteria (TBCs) for vapor intrusion issues.

Please submit the requested supplemental information and a written response to comments contained in the EPA and Nobis letters by February 15, 2008.

Please call me if you have any questions.

Sincerely,

James M. DiLorenzo
Remedial Project Manager
USEPA Region 1 - New England

Enclosures

Cc: Wesley Kelman, EPA
Rick Sugatt, EPA
Dick Willey, EPA
Heather Ford, Nobis
Joe Coyne, MassDEP
Michael Caira, Town of Wilmington
Michael Webster, GeoInsight
Martha Stevenson, WERC

EPA Region 1 RAC2 Contract No. EP-S1-06-03

30 November 2007
Project No. 80021
DTN-MA-1255-2007-F

Via Electronic Submittal

U.S. Environmental Protection Agency, Region 1
1 Congress Street, Suite 1100
Mail code: HBO
Boston, MA 02114-2023

Attention: Mr. James M. DiLorenzo, Task Order Project Officer

Subject: Preliminary Review of the Draft Focused Remedial Investigation Report
Olin Chemical Superfund Site, Wilmington, Massachusetts
Olin Chemical RI/FS Oversight
Task Order No. 021-RSBD-01CH

Dear Mr. DiLorenzo:

Attached with this correspondence are the preliminary review comments prepared by Nobis Engineering, Inc. for the *Draft Focused Remedial Investigation Report, Olin Chemical Superfund Site, Wilmington, Massachusetts.* The Nobis team is continuing its review of the 4-volume report and anticipates providing additional, more detailed comments in the future.

Should you have any questions or comments, please contact me at (978) 722-1013 or HFord@nobisengineering.com.

Sincerely,

NOBIS ENGINEERING, INC.

FOR

Heather M. Ford
Sr. Project Manager

Attachment

cc: File 80021/MA (w/enc.)
P. Delano, M. Bouvier/Nobis (w/o enc.)

PRELIMINARY REVIEW
DRAFT FOCUSED REMEDIAL INVESTIGATION REPORT
OLIN CHEMICAL SUPERFUND SITE
WILMINGTON, MASSACHUSETTS
EPA Contract No. EP-S1-06-03
Task Order No. 0021-RSBD-01CH
30 November 2007

1.0 INTRODUCTION

Nobis Engineering, Inc. (Nobis) has been requested by the U.S. Environmental Protection Agency (EPA) to review the *Draft Focused Remedial Investigation (FRI) Report*, dated October 2007 for the Olin Chemical Superfund Site (the Site) prepared by MACTEC Engineering and Consulting, Inc. on behalf of the Responsible Parties (RPs).

As discussed with EPA, Nobis prepared preliminary general and specific comments for the FRI Report. The preliminary review comments are presented in the following sections. Once the comprehensive review is completed, detailed comments will be prepared and submitted.

2.0 GENERAL COMMENTS

1. The FRI Report summarizes the data and conclusions from a large number of previous investigations. For this reason, it is imperative that statements of fact be referenced to their sources, to ensure the accuracy of the citations and that the statements remain in context. Although a reference list is included in Section 8, it is impossible to confirm which reference(s) support the statements of fact in certain portions of the FRI Report, such as Section 2.2.2.2. The lack of referencing throughout the FRI Report reduces its usefulness significantly.

2. Vertical gradients in shallow and deep groundwater (OU3) should be re-evaluated as to whether or not existing gradients align with the conceptual site model. The cessation of pumping of the Municipal Water Supply Wells (MWSWs) presents a condition where there is high potential for a change in the magnitude and direction of these gradients. Vertical gradients are a critical component of the site conceptual model and changes in gradients could translate into significant changes to the current site conceptual model, particularly as it conceptualizes surface water and sediment interactions with groundwater, and the effect of these gradients on the mobility of DAPL and Diffuse layers. Section 3.8 discusses a reevaluation conducted in 2004 of horizontal gradients after the cessation of the MWSWs, but omits to discuss whether or not the vertical gradients have been assessed as part of the reevaluation.

3. In several sections of the FRI, the claim is made that surface water and sediment in the Maple Meadow Brook Wetland and surrounding surface water bodies have not been impacted by site contaminants. In 2006 a surface water sample from MMBSW-5 reported levels of NDMA at 3.9E-6 mg/L, which appears to be above the detection limit for that batch of samples (RL inferred from data to be 1E-6 mg/L). This and other similar detections of NDMA in surface water were dismissed in the FRI as "being near the method detection limit", "not confirmed on both detectors during the analysis" and "may be false positives". These samples were "qualified with the designation NJ

indicating there was only presumptive evidence of NDMA", It is unclear who "qualified" these sample results (laboratory or RP) and why they were qualified. Furthermore these locations have not been sampled since theses detections. It is recommended that data be validated in accordance with EPA's data validation protocols to reduce ambiguities.

4. The FRI attempts to provide a summary of the historical risk assessments to allow for the identification of future data needs. However, unlike the ecological risk assessment (ERA), a summary matrix table listing each historical risk assessment to include what was evaluated, why, and what the primary concerns were, has not been prepared. A summary matrix is needed for the HHRA, which will greatly improve the conceptual understanding of the site and how the site has evolved over the years with interim remedial actions.

5. The exposure factors in earlier risk assessments appear to be underestimated or, at a minimum, should have had additional citations and justification.

6. Offsite exposures are likely underestimated or un-represented because potential future exposure pathways were not evaluated. For example the FRI report indicates that overland migration of soil contaminants and deposition on soils at adjacent properties are unlikely to occur because there are physical barriers (higher land elevation and structures such as roads and rail lines) that would prevent such migration. Physical structures can be altered as part of large redevelopment projects and additional lines of evidence are not provided to support exclusion of offsite exposures to soil.

7. The impact of contaminant fate and transport on exposure pathway selection was not clearly presented to justify the inclusion or exclusion of exposure pathways. It appears that the HHRAs focused on current exposures and not future hypothetical exposure to document the need for land use controls or remedial activities under CERCLA.

8. The statements made regarding the lack of interconnection between on-and off-Property surface water bodies and the Maple Meadow Brook Wetland area disregards the evidence of groundwater discharge to the Maple Meadow Brook Wetland described in the Conceptual Site Model and Section 3.

9. It does not appear that the possible downgradient extent of DAPL in the bedrock valley underlying Maple Meadow Brook has been adequately determined. What is needed to determine the absence of further DAPL pools are groundwater data (collected from the bottom of the overburden aquifer) from the next downgradient bedrock depression that is configured to collect DAPL, which do not indicate the presence of DAPL. The existing bedrock surface contour map does not appear to provide this information. Additional subsurface data in the vicinity of well GW-87D could establish this area as such a location (as it stands currently, it does not appear to have the requisite closure "saddle" to potentially form a DAPL pool). However, data collected from GW-87D in the second quarter of 2006 indicate chloride at 1,100 mg/L and specific conductivity of 6,000 µmhos/cm, both approximately one-third of the DAPL parameter included on Page 2-18. These results are significantly higher than those from "Diffuse Layer" locations known to be proximal to a DAPL pool, or along former DAPL migration routes to a further downgradient pool.

In particular, the configuration of the bedrock valley is poorly defined beyond the northernmost seismic reflection line depicted on Figure 3.2-2. As presented in Figure 3.2-2, the GW-73S/D couplet and the Town Park well are not located along the deepest portion of the bedrock valley, where the DAPL pools would need to be located, so these wells certainly do not confirm the absence of DAPL in this area.

3.0 SPECIFIC COMMENTS

1. In Section 1.3 (as well as Section 2.1.2.2.2, Page 2-23), descriptions of relationships between the slurry wall, the elevations of groundwater and DAPL within and outside the slurry wall are unclear. The Conceptual Site Model and bedrock geologic map (Figure 3.2-1) confirm that the Western Bedrock Valley exists due, in large part, to preferential erosion in a fracture zone. Since the DAPL is sitting in a bedrock depression that contains fractures, what prevents the migration of the DAPL beyond the containment area via bedrock fracture flow? Doesn't the gravel equalization window provide a constant head source to assist the density flow of DAPL into bedrock fractures? A figure depicting the Slurry Wall/Cap Containment Area and the groundwater, DAPL, and bedrock elevations would be very helpful. This figure should include details of the groundwater monitoring network in place to confirm the operation of the Slurry Wall/Cap Containment Area.

2. Section 2.1.2.2: On Page 2-16, the statement "The DAPL...and the locations where it is present have been delineated." appears overly certain. Preliminary review of the available data indicates that there appear to be other potential DAPL collection points that have not been investigated to determine whether DAPL is present.

3. Figure 3.2-1: The figure depicts groundwater elevation contours, but does not include the groundwater elevation data used to generate the contours. It is common practice to provide the locations and values of the groundwater elevation points as part of the groundwater contour map. The inclusion of these data allow the review of the map for errors, as well as assessing the resolution of the data set. Further, the legend of the figure does not specify what datum the groundwater elevations are referenced to (e.g., Mean Sea Level versus an arbitrary datum). Finally, an additional groundwater flow map, at a larger scale, should be provided for the vicinity of the Olin Chemical property, since the increased data density would be better depicted in such a format, which should also include post-construction monitoring results for the slurry wall containment structure.

4. Section 3.6.3 states that the "Zone II boundary was developed from a water supply study prepared for the town of Wilmington in 1990...". This section also acknowledges that the zone was very conservatively based on a coarse, regional scale MODFLOW groundwater model. The FRI details the location and behavior of a groundwater divide located in the northern portion of the site near the established Zone II boundary. The groundwater divide has been extensively studied though years of groundwater elevation measurements. Groundwater to the north and west of this divide has been observed to flow to the north and west towards the Maple Meadow Brook Wetland and into Zone II. It appears the resolution of the Zone II boundary has been refined though these local measurements. The Zone II boundary should be interpreted as the groundwater divide and not the division created by a

coarse regional scale groundwater model, all groundwater to the north and west of the divide should be classified as being within the Zone II boundary.

5. Section 4.2.2.1 states:

   "Background specific conditions for sediment were investigated prior to the 1997 supplemental Phase II report (Smith). One toxicity test reference location (background) sediment sample was collected in January 1997 and was not included in the original background dataset evaluated as part of the 1997 Supplemental Phase II. The analytical results for this reference location sample are similar to the background sample results".

   A seemingly high "background" value of 897mg/kg is used in the FRI for ammonia in both on- and off- property sediments, including the Maple Meadow Brook Wetland area. This value is presented in Table 4.1-15 of the FRI and is assumed (the location or sample ID of this background sample is not reported in the FRI) to be the result of sample BS012REF, collected on January 20 1997. It is important to note that Table 4.1-15 suggests that a background value for ammonia has been determined using only one data point.

   Figure 2.1-15 of the FRI depicts the locations of surface water and sediment background sample locations and mirrors Figure 4 in Appendix R of the Smith report. These sample identifications do not match those collected on January 20, 1997 but reflect the samples collected as part of and included in the Smith report. It should also be noted that neither figure depicts sample location BS012REF. Table A2-3 in Attachment 2 of Appendix R of the Smith report does not report ammonia results for the background sediment sample locations as depicted in Figure 4 of the Smith Report or consequently Figure 2.1-15 of the FRI. It is unclear where the background value of 897 mg/Kg for ammonia in sediment originated from or why it was not included in the Smith Report. It should be noted that some of the data reported as background in Table 4.1-15 of the FRI mirrors that of the background data presented in Table A2-3 in Attachment 2 of Appendix R of the Smith report.

   Furthermore Section 4.1.2 of the Smith report discusses a sediment sample collected from 375 feet upstream of the site in the east ditch that was intended to represent background conditions at the site. This sample, SW-30, collected on April 20, 1993 (ammonia result of 21 mg/Kg) was determined by the Massachusetts Department of Environmental Protection to be unsuitable for use as a background sample as it did not meet the definition of "background" because it was likely to have been affected by upstream contaminant sources.

   A suitable background value of ammonia in sediment has not been established and statements that site contaminants have not impacted sediments in the Maple Meadow Brook Wetland are unfounded due to this lack of data.

6. Section 4.3.1.1: On Pages 4-67 and 4-69, the FRI Report does not make clear whether the Western Bedrock Valley Pool is the last pool in the series, or whether additional investigations are required to make this determination. See Specific Comment 3

7. Section 4.3.1.1: On Page 4-69, the FRI Report does not indicate that the thickness or the elevation of the controlling bedrock saddle for this pool have been determined, as they have been for the other DAPL pools, or whether additional investigations are required to make this determination.

8. F.1.1.1.1 Evaluation of the Potential Human Health and Environmental Risks for the Olin Facility, January 1991, Introduction and Purpose, Page F.1-2

   This section indicates that soil, groundwater, and surface water samples were collected as part of this study. It is unclear why sediment was not collected.

9. F.1.1.1.1 Evaluation of the Potential Human Health and Environmental Risks for the Olin Facility, January 1991, Section, Hazard Identification, Page F.1-2

   The third paragraph indicates that the former lagoon areas was excavated and replaced with clean fill. However, it is unclear why soil sampling was conducted only below the former lagoons at depths between 15 to 26.5 ft bgs and not at surface locations downgradient of the lagoon to characterize potential overflow from the lagoons.

10. F.1.1.1.1 Evaluation of the Potential Human Health and Environmental Risks for the Olin Facility, January 1991, Page F.1-3.

    Current on-site risks were not calculated for the evaluation of the potential human health risks for the Olin Facility, January 1991. The text states that current on-site exposures to soil were not reasonable exposure routes based on the nature of the work that on-site employees conducted. Since exposure factors for future construction worker were likely underestimated (or at least not supported) and still resulted in risks greater than 1E-3, it is very possible current risks may have been posed by incidental "current" exposures at the time of the 1991 study.

11. F.1.1.1.1 Evaluation of the Potential Human Health and Environmental Risks for the Olin Facility, January 1991, Section, Exposure Assessment, Page F.1-3

    This section indicates that only a future construction worker and a child trespasser were evaluated because "current on-site exposures to soil were not reasonable exposure routes based on the nature of the work that on-site employees conducted." Under CERLCA, to determine the need for future land use restrictions on the site, the evaluation of a future residential and industrial exposure scenario would be expected.

12. Table F.1-4 Exposure Parameters, Evaluation of the Potential HH and ER for the Olin Facility, January 1991

    This table lists exposure factors for a construction worker that deviate significantly from EPA standard assumptions as well as MADEP standard assumptions. They should include citations or justification for construction worker assumptions. For example, the ingestion rate of 70 mg/day appears low relative to the EPA's default value of 330 mg/day and MADEP's value of 100 mg/day; the inhalation rate used in the report was 9 m^3/day which is less than

half of the rate used by EPA and MADEP of 20m^3/day; and a surface area of 1700 cm^2/day was used relative to standard defaults of 3500 cm^2/day for MADEP and 3300 cm^2/day for EPA. These examples indicate that exposure and risks may have been underestimated. In addition, future receptor risks were not evaluated to understand the need for area use limitations (AULs) or land use restrictions.

13. F.1.1.1.3 Phase II Human Health Risk Assessment, June 1997, Hazard Identification, Page F.1-14

    Use of 3 out of 10 samples as a threshold for dropping chemicals based on frequency is not supported by EPA HHRA guidance. The guidance allows for screening out chemicals using a frequency of detection (FOD) of less than 5%, however, if the chemical may be site-related, the use of FOD is not recommended. EPA Region 1 does not typically allow FOD to be used at all in screening.

14. F.1.1.2.2 Lake Poly Update to the Focused Risk Assessment Report, October 11, 2001, Introduction and Purpose, Page, F.1-34.

    Used an "unspecified future use scenario", however, it is not clear what that is and the risks were within acceptable limits.

15. F.1.1.3.1 Public Health Risk Assessment for White Floc and Surface Water, May 18, 1992, Page F.1-39.

    No maintenance worker was evaluated, only a trespasser. They should also consider evaluating a maintenance worker or explain why it is not an issue.

16. F.1.3.4 Update to the Environmental and Human Health Risk Assessments for the South Ditch, June 14, 2005, F.1-47

    It appears that risks in 2005 were calculated by ratio against the 1997 risks. However, there is no statement describing whether toxicity values or exposure methods have changed. Using a ratio approach against risks calculated based on outdated toxicity values or exposure factors may not provide a conservative assessment of risks in 2005. In addition, the recent data for surface water and sediment did not include all the organic compounds that have been detected at the site previously. However, the report states that the underestimation of risks does not appear "substantial." More information and supporting documentation may be needed to evaluate the reports conclusions of no substantial risks.

17. West Ditch Study Area, October 10, 2003, Exposure Assessment, page F.1-83

    This section states that vapor migration from groundwater was evaluated in the 1997 HHRA; no additional VOCs were detected in shallow groundwater samples collected since the 1997 HHRA. Therefore, it is stated that the conclusions of the 1997 HHRA with respect to potential migration of VOCs into structures should still be applicable. In fact, this may not be applicable if the concentrations of VOCs are increasing over time; however, the concentration trends of the site were not discussed. In addition, vapor intrusion methods have changed

significantly since 1997, thus, the risks cannot be verified and may need to be reconsidered.

18. F.1.3.1.1 Evaluation of the Potential Human Health and Environmental Risks for the Olin Facility, January 1991, Page F.1-55

    This section indicates that there are no current uses of the groundwater at the site, and future uses were considered unlikely based on anticipated deed restrictions, so they did not evaluate risks to groundwater onsite even though there is no AUL in place. Typically, they would be required to evaluate onsite exposures if an AUL was not in place. We're not sure if this AUL issue would be a concern to the EPA and the MADEP or if they are comfortable with the exclusion of future use. In addition, the maximum plausible exposure scenario for groundwater was exposure to a potable well at the southwest edge of the site. The report only looked at a residential adult as the maximum plausible receptor. Since the report identified unacceptable risks, it is also likely that child exposure would be a concern. Vapor intrusion also was not evaluated and this could result in an underestimation of risk.

Preliminary Comments on Olin Focused RI

Wilmington Environmental Restoration Committee (WERC)

November 30, 2007

1. **Overall Comments on Draft Focused RI**
    a. Report is very informational, but not useful as a basis for future decisions including a comprehensive remedial work plan
    b. Good summary of site activities over the years, but no objective evidence showing results of activities. The current state of the site is unclear
    c. The claim that all hazardous materials and waste have been removed from the property is not consistent with the knowledge of community members who have followed activities at the site for many years
    d. Presentation of data seems to be designed to obscure rather than illuminate information
    e. For off-site groundwater, report focuses only on DAPL, not dissolved layer
    Needs additional information and analysis of dissolved layer contaminants – e.g., NDMA, ammonia and others
    f. Regardless of the challenge in understanding the existing data, we foresee the need for a significant monitoring program to fully understand the current conditions and trends as well as the extent of the contaminants in all 3 OUs
    g. Report seems designed to frustrate even the most determined reviewer

2. **Data Presentation**
    a. No index, no particular order for the data
    b. Only compiled info is metadata or 10 yr averages
    c. 10 yr averages are not meaningful, given changes, plume movement, and cessation of town well pumping
    d. No way to look at time series for particular well/sampling location
    e. No way to tell current level of contaminants in all wells/sampling locations
    f. Mapping should show current levels of contaminants, not 10 yr averages, and should be compared with background, not an arbitrary standard.
        i. Why are "current conditions" not shown on maps?
        ii. Zone II aquifer protection district(s) should be shown on all maps
    g. Summary tables – difficult to find amid the metadata tables
        i. Uncertain of criteria for determining if "representative of current conditions"
        ii. No spatial or temporal information, so impossible to determine patterns or boundaries of contamination on and off site

3. **Risk Assessment**
    a. Take issue with basic assumptions:
        i. Future site use is an open question – note that adjacent industrial site is now a family gym (see Boston Globe Business News Updates: http://www.boston.com/business/ticker/2007/11/gym_street_leas.html?s_campaign=8299)
        ii. For past risk assessments where Olin has not been able to meet applicable standards, they have questioned the applicability of those standards, such as NDMA at the municipal drinking well sites, residual Kempore left in Lake Poly area, and ambient water quality criteria for ammonia and chromium in South Ditch
        iii. Presumes no contact with groundwater, whereas public drinking water wells need to be assumed operating in future
        iv. Presumes that current wildlife/flora/fauna in the ditches will determine ecological cleanup standard, as opposed to cleaning up to meet ambient water quality criteria
        v. No data presented to demonstrate that private wells (both industrial and residential) are not being impacted
    b. ARAR's have yet to be agreed upon, but we expect that they will require groundwater to meet drinking water standards and surface water to meet ambient water quality criteria
    c. For any contaminants that do not have applicable drinking water or water quality standards, we foresee the need for a new risk assessment that presumes exposure based on agreed upon criteria

4. **What are the questions that need answering?** ***The report needs to be modified to clearly address these critical questions, providing evidence to back up claims and clearly indicating where additional work needs to be done:***
    a. **Current Contamination Levels**: What are the current groundwater, surface water, and soil contamination levels at all monitoring sites for all expected contaminants?
        i. What are the boundaries of contamination in all operable units?
            1. OU1 (Soils, sediments and surface water on-site)
                a. Much work has been completed, but current monitoring data to is needed to confirm progress made and define what more needs to be done.
                b. What contaminants are within slurry wall containment area?
            2. OU2 (Surface Water and sediments off site)
                a. Olin agrees there are still contaminants in South Ditch (OU2)
                b. Need more information on dissolved plume's impact on surface water in Maple Meadow and Saw Mill Brook.
                c. Does boundary of contamination to the south overlap with other hazardous waste sites? (e.g., high levels of ammonia and chromium)

3. OU3 (Groundwater on and off site)
    a. Still need to adequately bound DAPL and dissolved plumes. Need additional monitoring wells to determine extent of contamination.
    b. Have all private wells been tested recently?
    c. What are current contaminants and their levels in dissolved plume?
    d. Need bedrock wells to determine if contaminants are traveling through bedrock formation. Is DAPL is reacting with and eroding bedrock?

b. **Contaminants:**
    i. Are there contaminants that have not been tested for, but are present?
        1. Are there chemicals likely to be present either because of historical site chemical use (e.g., Opex, Wytox, etc.) or degradation products of those chemicals?
        2. In the spectrum analyses, have other peaks been observed indicating particular chemicals not routinely tested for?
    ii. Do we know the level of hexavalent chromium, formaldehyde, amines, ammonia and other prominent contaminants on and off site?
    iii. What are the key contaminants? NDMA, hexavalent Chromium, ammonia, DEHP (BEHP), formaldehyde, and what others?

c. **Trends in Contaminant Levels:**
    i. Are the groundwater plumes moving?
    ii. If so, in what direction(s)?
    iii. How have groundwater trends changed since town wells ceased pumping?
    iv. Have the source control measures succeeded in keeping the DAPL from moving and from diffusing upward into diffuse groundwater layers?

d. **Sources of Contaminants**
    i. Are NDMA and other contaminants simply pervasive on and off site from historical sources and transport, or are there still sources on the site contributing to ground and surface water contamination?
        1. E.g., are there still drums of hydrazine, Opex, or Kempore contributing to on-going NDMA formation?

e. **Site Natural features**
    i. Where is the current groundwater divide? What are current groundwater flow patterns?
        1. How has the groundwater flow changed since Olin ceased operations (discharges influenced groundwater) and Wilmington ceased pumping at wells?
        2. Bedrock features – are there fractures, crevices, channels or other bedrock features that can be used to predict where DAPL may be?

5. **Things that Annoy Us**
    a. Surface water "dilution" seems to be the solution to the problem of ammonia and chromium levels in surface water in the East and South Ditch.
    b. Chromium "attenuated" by going from DAPL to dissolved layer. This is seen as solution, whereas it is just being adsorbed onto soil.
    c. Ignoring dissolved plume of very high concentrations of ammonia on and off site. Masking high concentrations on maps by comparing them to arbitrary high action levels rather than background levels.

MEMORANDUM

To: Jim Dilorenzo
From: Rick Sugatt
Date: January 8, 2008
RE: Review of October 2007 draft Focused Remedial Investigation Report

I reviewed the above-referenced document and some of the previous risk assessment documents with regard to major risk-related items. I did not review specific factors such as exposure assumptions, human health or ecological screening values or toxicity values, concentration modeling, or the validity of general conclusions made concerning risk because there are so many differences between EPA risk assessment and MADEP risk assessment methodologies that it would not be productive to review the specifics of the previous risk assessments.

I have the following general and specific comments:

General Comments

1. Per the negotiated RI Work Plan and Risk Assessment Work Plans, future EPA risk assessments may be needed to account for differences in risk assessment methods between the MCP and EPA. As detailed in separate comments below, notable differences in risk assessment methodology include chemical of potential concern (COPC) screening concentrations, use of background to eliminate chemicals of potential concern, calculation of exposure point concentrations (EPCs) as an average rather than 95% Upper Confidence Limit (UCL), and elimination of risk assessment of exposure pathways based on presumed or implemented engineering or institutional controls. Eliminating chemicals based on background and calculation of EPCs as averages rather than 95% UCLs can result in lower risks than in EPA risk assessments. EPA therefore makes the rebuttable presumption that the risks in previous reports are underestimated due to these and other differences in methodology. EPA agrees that this presumption can be rebutted by demonstration that use of current EPA-approved methodologies and toxicity factors does not have a significant effect on previously calculated risks or risk management conclusions. Examples of acceptable rebuttal arguments include demonstrating for a particular study that no detected chemicals were eliminated based on background, or that the maximum concentration was used as the EPC.

2. The supplemental phase II risk assessment did not address residential risks of chemicals in groundwater because it was assumed that Activity and Use Limitations were or would be in place. Even though EPA acknowledges that groundwater chemicals exceed chemical-specific ARARs (MCLs), EPA requires a baseline risk assessment for residential groundwater use in order to develop remedial goals in any eventual Feasibility Study.

3. EPCs should be calculated as 95% Upper Confidence Limits on the arithmetic average, rather than the simple average, as used in the MCP. EPCs should be calculated using ProUCL v. 4. All input concentrations for a particular EPC should be documented by attachment to a copy of the ProUCL output so that EPA can reproduce representative calculations.

4. Per EPA Region I risk guidance, the EPC in groundwater should be the average of multiple rounds in a particular well or the maximum concentration in any well. EPA looks forward to further discussion concerning the derivation of representative groundwater and soil EPCs.

5. Per EPA Region I risk guidance, screening for COPCs should utilize residential screening levels that represent a hazard quotient of 0.1, rather than 1.0 for non-carcinogens and a cancer risk level of 1E-06 for carcinogens. Since EPA Region 9 PRGs have not been updated, please use the lowest residential screening level among the currently available screening values from EPA Region 3, 6, and 9, and MADEP GW-1 and S-1 Standards.

6. Per EPA guidance, chemicals should not be eliminated from screening or risk assessment based on background. Similarly, chemicals in aquatic and terrestrial environment should not be eliminated from ecological toxicity screening or risk assessment based on anthropogenic background (i.e. local conditions for aquatic habitat under the MCP) or minimal surface area.

7. Calculations of background concentrations and the determination of statistical differences between background and site concentrations should be conducted using EPA background guidance documents and the background calculation module in ProUCL v. 4.

8. The potential for vapor intrusion risk should be evaluated per EPA's 2002 *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soil (Subsurface Vapor Intrusion Guidance)*. Any chemical that is screened out because the groundwater concentration is less than the MCL should also be screened based on risk-based indoor air concentrations associated with a 1E-06 cancer risk or a HQ =1. EPA Region 1 will provide risk-based target groundwater concentrations for those chemicals which were truncated at the MCL.

9. Dermal risk should be evaluated per most recent EPA dermal guidance.

10. Risks due to showering should utilize the most recent guidance.

11. EPA's "Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens" should be used to evaluate risks to trespassers and future residents for chemicals that have a mutagenic mode of carcinogenesis, as listed in the guidance, notably some PAHs and nitrosamines.

12. Please provide a copy of the 1991 risk assessment by Envirologic Data that is cited in Appendix F of the above-referenced report. This reference appeared in the reference list at the end of the text in Appendix F on pages labeled R-1 through R-6. The reference is : "Envirologic Data. 1991. *Evaluation of the Potential Human Health and Environmental Risks for the Olin Facility*, January".

13. The toxicity factors for Opex, Kempore and diisobutylene should be updated using currently available literature.

14. The human health toxicity factors (IRIS, HHPPRTV, other sources) and ecological toxicity factors (NRWQC, EPA benchmarks, EcoSSLs, etc.) should be updated. Olin should identify the updated toxicity factors and their sources so that EPA can review and approve them prior to usage in a draft risk assessment report. EPA has requested toxicity factors and aquatic toxicity structure activity predictions (i.e. ASTER printouts) from NCEA and the Ecotox support staff and will share this information with Olin.

15. The discussions of the results of previously conducted Imminent Hazard Evaluations indicated that the non-cancer risks were below the MCP's Imminent Hazard risk criterion of HQ = 10. It would be useful to revise the draft document so that the actual HQ is provided parenthetically in the text so that EPA can evaluate whether the HQ exceeded EPA's risk criterion of HQ =1, using subchronic exposure parameters and toxicity values.

Specific Comments:

1. The supplemental phase II report did not address the risk of ammonia in the groundwater plume drawn by the Butter's Row wells because it was assumed that enough chlorine would be added to eliminate all ammonia, and that the resultant levels of chloramine in the municipal water supply would be below the MCL of 4 mg/L. This assumption is not realistic. Therefore, the risk of ammonia from the plume in municipal water should be evaluated quantitatively.

2. Section F.1.3.1.2: It is stated in the first paragraph that the 1993 PHRA was prepared "...in substantial compliance with the NCP." Please remove this phrase at this location and wherever else in the draft document that it is asserted that a MCP risk assessment is in substantial compliance with the NCP. The methodological differences between the two types of risk assessment are discussed in previous comments, and it is a matter of interpretation whether a MCP risk assessment substantially complies with the NCP. The MCP considers a site to be adequately regulated if it complies with CERCLA and the NCP, but the converse is not necessarily true.

Massachusetts Department of Environmental Protection Preliminary Comments on the *Draft Focused Remedial Investigation Report for the Olin Chemical Superfund Site*

By Joe Coyne, MassDEP

1. What evidence in the bedrock corings indicate that the fractures were completely infilled with precipitate and therefore reduced porosity and transmissivity to a point of almost negligible consequence?

2. How will the precipitation of Chromium (III) above the DAPL pools effect the hydraulic conductivity of the overburden and groundwater flow in these areas and will this in turn effect diffusion of the DAPL constituents into the groundwater?

3. Is there any change in groundwater flow or additional mixing of groundwater caused by the absorption/diffusion/advection processes occurring just above the DAPL, which may increase the movement of contaminants from the DAPL into the groundwater?

4. Is there any way to measure how rapid DAPL attenuation is occurring vs. DAPL diffusion into the groundwater?

5. What is the main reason for the rapid attenuation of contaminant concentrations vertically from the DAPL layer to the shallow groundwater? Is it simply a lack of mixing or lower permeability soils in these areas or both?

6. Please describe in more detail the "diffuse groundwater" described at the end of the first paragraph on page 4-64. Does it also have a unique specific gravity (similar to the DAPL)? What are the concentrations of contaminants? What are the migration patterns and fate and transport? Is there a correlation to density and contaminant concentration similar to identifying the DAPL pools?

7. On page 5-22, what are the margins of error in incorporating the trend analysis and the small amounts of data points? Did this have any effect the confidence of the conclusions?

8. Have any samples of wetland plant species been analyzed to trace potential accumulation of contaminants in relevant areas?

9. The conclusions indicate that the property is suitable for industrial/commercial development with institutional controls. Elaborate on the types of controls, which would achieve this objective.